DEPARTMENT OF NOTES, REVIEWS, ETC.

It is the purpose, in this department, to present from time to time brief original notes, both of methods of work and of results, by members of the Society. All members are invited to submit such items. In the absence of these there will be given a few brief abstracts of recent work of more general interest to students and teachers. There will be no attempt to make these abstracts exhaustive. They will illustrate progress without attempting to define it, and will thus give to the teacher current illustrations, and to the isolated student suggestions of suitable fields of investigation.—[Editor.]

ON THE ONTOGENY OF CERTAIN INTERESTING INSECT STRUCTURES.

The young student of microscopy who studies carefully the chitinous structures of various Arthropoda will find many most interesting and peculiar formations. These are well worth an effort to understand.

Chitin, in a state of purity, is a white amorphous substance, and is excreted by the cells of the epidermis. It is secreted in a semi-fluid form and hardens rapidly on exposure to the air. Chemically, it is supposed to be expressed by the formula $C_{17}H_{14}NO_{12}$. The chitin is manufactured in the cytoplasm of the cell, probably by specialized plastids analogous to the chloroplasts of plants.

In most cases it is produced in rows or strands of small particles, which are extruded thru the wall of the cell; and upon hardening it forms an encasing mold of the surface on which it hardens.

The extrusion of these cell products in vesicular shaped cell membranes forms the various kinds of scales found on insects,—the strings of particles forming the striations which give these scales their refractive properties.

Thus a single cell may produce branched or plumed scales, or spines of various shapes; and even spines or scales with a sensory function. In this latter instance the cell retains its living contents during adult life.

The cross-section of the chitinous foot-pad on the foot of a grasshopper, as shown in Fig. 1 (Plate V), furnishes us with a very

complex series of ontogenetic changes in the cells of the chitin organ.

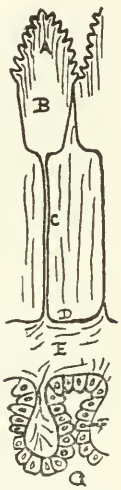

Fig. 2. Diagrammatic sketch of one of the units in the chitinous pad of the grasshopper's foot. The letters correspond in significance with those of Fig. 1.

Originally the cells of the hypodermis (epidermis) were situated on the exterior, as at the point marked A. They were then true epidermis spine cells, each cell being an irregular hexagon and having for its sagitlal outline the form of a short spine with a toothed margin.

The chitin-organ cells (F) then began their excretion of chitin which gradually hardened on exposure to the air. This stage was continued until the section marked B was completed,—the spine cells still being hexagonal, with an opening at each corner of the hexagon.

At the end of the period in which B is formed, a radical change occurs: the six channels at the points of the hexagonal cells now coalesce into a single channel (C) which persists thru a long period of secretion, until the point marked D is reached. At this time another radical change in the process takes place. The secreting cells (F) become entirely detached from the chitinous pad (A-B-C-D), and form a convoluted gland surface which pours its secretion into the space which is formed at E.

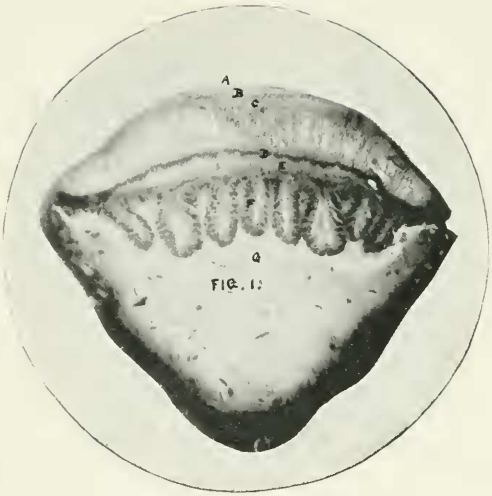

Fig. 1. Photograph of the footpad of the grasshopper.

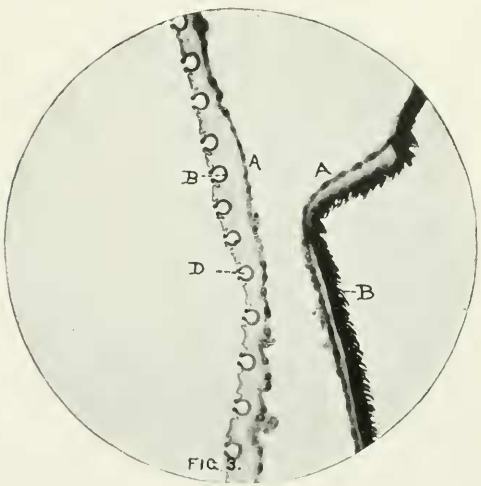

Fig. 3. Photograph of a section of the tongue of Horse-fly, showing the pseudo-tracheal grooves.

Plate V